Deep Green (BAA 07-56) FAQs

Last Updated 26 JULY 2007

PREFACE

In the event of a discrepancy between the material shown here and the Deep Green BAA, the Deep Green BAA takes precedence.

QUESTIONS and ANSWERS

1: Can I propose to all 6 Tasks?

A: Yes, BUT, you must submit a separate proposal for each task. AND, if DARPA selects your proposal for Task 6--Test and Evaluation your proposals submitted for the other tasks will be considered as "non-selects" even if your other proposals would be considered "selectable" according to the evaluation criteria. This is to avoid conflict-of-interest situations between technical and evaluation tasks.

2: Please expand on what we can bid on, i.e., any one of the six tasks with respect to the three phases?

A: You can bid on as many tasks as you want. You're bidding on Phase I with options for Phase II and III. Anyone can be prime on task 3, for instance, and sub on task 4.

3: Regarding the restriction of being selected for task 6 and other work. It is clear that one bidder cannot be the prime for task 6 and also prime any other tasks. The question we had was regarding teaming. Specifically, can a bidder be selected as the prime for task 6 and be on a winning bid as a subcontractor on other tasks? Going the other way, can a bidder be selected as the prime for one of tasks 1-5 and be a subcontractor on the winning bid for task 6?

A: Again, if you are the prime or sub on the T&E (task 6) contract you cannot be a prime or sub on any of the other contracts.

4: If I don't bid Task X for Phase I, will I have a chance to bid it for Phase II?

A: At this time, we do not intend for there to be additional solicitations in future phases.

5: Which options shall be considered – Generation of Optimized Futures, where such game-theoretical optimization of paths to the future would be a desirable technology or, otherwise, Generation of Permutations of Futures, where only mechanical permutation of options will be produced by the Crystal Ball, or both options?

A: First, distinguish options from futures. Options are courses of action that are being considered. Futures are the results of options. A RED COA against a BLUE COA does not generate one possible future but a host of possible futures. Crystal Ball assembles

the permutations of options generated by the human. At that point, there is no value judgment as to the goodness of the human-generated options. Blitzkrieg generates a "broad set of possible futures." This may or may not be an exhaustive set of possible futures, but it must be more than the one most likely or optimal future. The intent is that the commander always has OPTIONS prepared regardless of what state the operation reaches. To avoid creating every possible future (an impossible task), Crystal Ball tries to predict which possible futures are becoming more likely to focus the commander on generating options for THOSE possible futures.

6: With this approach of combining Automated Options Generator with Crystal Ball would a proposer be permitted to bid for both Crystal Ball and Automated Options Generation in one proposal?

A: No! You must submit separate proposals for each of the six tasks in which you are interested. The government will choose the best approach for each component. Linked proposals are not permitted.

7: Will a developer of the Crystal Ball or the Automated Options Generation be allowed to provide the Multi-Resolution Modeler and interaction with Geo-Spatial Data as a sub-module for the Blitzkrieg module?

A: The BAA states that component developers must make use of functions allocated to other components. If Crystal Ball needs a multi-resolution model, it should plan to make use of Blitzkrieg. Deep Green will not have three or four disparate combat modelers scattered around it. Performers are free to participate in teams competing on different tasks. A performer could compete as the prime on Task 4 and as a sub on Task 2, for instance. The only restriction is that if a performer is a prime or a sub on the Test and Evaluation task, that performer cannot be part of any of the other tasks, either as a prime or sub.

8: In reference to proprietary components, DARPA and, subsequently, US Army recognized this in the past and developed several approaches to handling proprietary components including favorable license pricing, bundles of free licenses, and other mechanisms. Will such measures be considered to alleviate this situation?

A: As stated in the BAA, proposals that come with rights other than unlimited for government use will be penalized during assessment.

9: Will the testing and evaluation contractor be responsible for protocol review and IRB review for Deep Green human subject testing?

A: No, this was waived for Deep Green by DARPA since the military will be the subjects who work with Command and Control systems on a daily basis.

10: How about modeling non-kinetic (DIME/PMBSII) both in simulation (Blitzkrieg) and in Sketch-to-Plan (specifying intended non-kinetic effects)? Is this out of bounds for the program?

A: If DARPA pursues Phases II and III, they will be focused on counter insurgency, the three block war, and non-kinetic effects. Phase I will be primarily mid-intensity conflict and kinetic effects.

11: How about the long-term effects? I am thinking about the "Bay of Pigs" situation.

A: We will address influence operations that are appropriate at the brigade level in Phases II and III.

12: Should Blitzkrieg consider cultural models?

A: Yes. We have to model some cultural factors, but Blitzkrieg is not meant to be heavyweight. Think about what a brigade commander should consider at his level and make that a part of your proposal.

13: What is the target time that the commander has to wait for a decision(s) to be advised?

A: Sketch to Decide must present decisions in sufficient time so that the commander can consider decision factors, make decisions, communicate them to subordinates in time for them to act accordingly.

14: Please describe the seedlings. What was accomplished (e.g., what was successful)? What were the holes?

A: We have four Deep Green seedlings, two addressing sketching and plan induction and two addressing representation and metrics.

- Draper/MIT – demonstrating feasibility of sketch recognition
- Lockheed/ATL - specifically on plan induction
- ISI - looking at management of graph and how to compute metrics on the fly
- Adventium/SIFT/Honeywell - looking at data representation – state and plan, trying to define necessary and sufficient data needed in plan and state representation.

More info may be made available after proposals are submitted.

15: It might appear that the seedling performers will have a leg up on the proposal. How will you keep the playing field level?

A: In most cases, the seedling performers were trying to show feasibility of a solution to the problem. That does not mean the solution they came up with to demonstrate

feasibility is the best solution to the problem. Seedling performers will not get preferential treatment during proposal reviews.

16: The integration slide said "independent". Can the integration contractor be on other non T&E teams?

A: Yes, but you need to address how you'll take an unbiased view of the integration role. Keep an independent perspective.

17: The BAA provides examples of external systems that must be integrated. When will the full list be defined?

A: The full list should be smaller than the list in the BAA. We will likely choose *either* FPCB2 or CPoF, based on feedback from the potential users, but we may have to support both. The list most likely will not grow during the execution of Deep Green

18: Will the integration contractor be required to write interface code for external systems (e.g., CPOF)?

A: Yes, either write it or find existing software to incorporate. The integration contactor will make it easy for Crystal Ball or Sketch to Plan to integrate with battle command systems. The BAA says that the integration contractor must assist the Commander's Associate contractor integrate their component into CPoF. That may require them to write or find interface code. The intent is for the integration contractor to abstract the complexities of dealing with real battle command systems so that the other component developers can concentrate on their tasks.

19: Will DARPA contract directly or use an outside agent?

A: The contracting agent for Deep Green will be CERDEC. All vehicles will go through them. CERDEC and PEO C3T is the transition candidate. As is stated in the BAA, proposals must address any Organizational Conflict of Interest (OCI) challenges.

20: Should tables indicate government fiscal year (GFY) or calendar year?

A: Fiscal Year.

21: Where do you envision incorporating Deceptions in Deep Green plans to make it harder to "case" us?

A: Deep Green will assume the information from the PASS (or similar data base) is authoritative and complete. Deep Green is not trying to solve the information and data fusion problems or trying to build the Common Operational Picture (COP). If you have a technology that can assist with seeing through deceptions, feel free to propose that IN ADDITION TO addressing the requirements specified for a particular task.

22: Do you want Blitzkrieg to handle sudden requests from Crystal Ball to help keep options open?

A: Yes, we're not doing option generation just at the beginning. The commander must be able to start sketching options from any view in Sketch to Decide. As soon as the commander is done creating a sketch, whether before or during an operation, the options will be passed to Crystal Ball. Blitzkrieg will generate futures whenever it is passed a set of options to explore.

23: Should Deep Green provide feedback if a user-defined sketch is infeasible?

A: As the commander is drawing a sketch, if it's something that's impossible, we don't want to stop the commander from drawing, but we do want to provide unambiguous feedback that something about the sketch is infeasible. This may be corrected by the user later, or it may be a source of a "clarifying question" posed by Sketch to Plan later. Similarly, when Blitzkrieg is simulating a set of options and it reaches and impasse, it is not necessary for Blitzkrieg to try to fix the plan through SAF-like behaviors. If the plan reaches a dead end, and the commander needs to generate options, that is good feedback.

24: How are failures in Phase I components to be handled?

A: Since there likely will be only one performer in each phase/task, failure on any task could kill the program. We sink or swim together. We all need to work together; everyone may need to make compromises along the way.

25: You talk to combat models but counter insurgency (02) must deal with social models, belief structures, population modes, etc (like IBC – COMPOEX). How do we "call" these or must Blitzkrieg be up to that task?

A: Yes, there needs to be some level of social modeling built into various components of Deep Green. Each component does not need to contain a very heavy, high fidelity model, but social factors must be addressed in sufficient detail to get the job done. Your proposal should address how you intend to support the counter insurgency, three block war, and contemporary operating environment issues that will be part of the envisioned Phase II and III testing.

26: Some ambitious areas (e.g., sketch recognition) are not labeled DARPA hard. Are you looking to advance these or just use "best available" technology as is?

A: No, we're looking to advance across the board. The whole system has to work. The fact that the sketch recognition task – or any other task – is not highlighted as "DARPA hard" does not mean it isn't hard or that we don't want to make huge leaps forward in that area. The idea is to advance in as many orthogonal directions as we can.

27: Humans use substantial context to interpret a sketch. Will Commander's Associate exploit known situation, IPB, mission data?

A: The Sketch to Plan component will clearly need a substantial degree of domain knowledge; however, the intent is not to formally input a mission statement, commander's intent, etc. The intent of Deep Green is to induce those things – and perhaps put them into a machine parsable form "under the hood" – from what the commander sketches and says as he is creating options.

28: Would you please discuss the differences between the integrator's "abstraction layer" and the test and evaluation "test harness"?

A: The test harness is what we wrap around the simulation to generate a real battle, collect data, etc. The abstraction layer will allow us to exchange information between real battle command systems and Deep Green.

29: Will Deep Green require a "co-located" design or can the various components be linked over a distributed net under CPOF interface?

A: Do all contractors need to be in same place? No. One monolithic solution? No. On the same computer? No, everyone will be talking to each other. On the other hand, we do want Deep Green to be something that can run in a distributed manner, if desired, or on a single machine, if necessary. The goal is not to add many new machines to a headquarters that have to be powered, administered, and maintained, so proposals should seek solutions that minimize the computing footprint as much as possible.

30: The BAA specifically references CPOF as the target environment for year 3. In your talk you referenced FBCB2 and others. Can you clarify?

A: Originally we were going to do one or the other. The battle command community is discussing a common C4I viewer, which will likely be built atop CPoF. In discussions with battle command folks, CPOF seems to be the right target.

31: Slide says "to be considered responsive, address all architecture boxes for your components". Does that mean if we are bidding Crystal Ball, we need to address "Sketch-to-Decide", etc.? Or does that mean we need to address all elements of the Crystal Ball box?

A: You must address all the functional boxes for the specific component in your proposal, such as Crystal Ball or Blitzkrieg.

32: Do performers need to include CPOF development costs in their proposals or will DARPA negotiate that work with PEO C3T?

A: Integrator needs to specify how they will integrate with CPOF or FBCB2. The dollars to do that integration should be part of integrator's proposal.

33: Will there be multiple awards per each task?

A: It is unlikely that there will be multiple awards for each task.

34: What is the rationale for the prohibition of use of intellectual property?

A: It is in the Government's best interest for the transition target to easily integrate Deep Green into real battle command systems.

35: Do you envision the functional boundaries between the tasks as open for redefinition in the proposal or in the program? Are the tasks metrics listed in the BAA complete? Are we encouraged to offer additional or alternatives?

A: The functional boundaries between components are not open to debate during the proposal process. Bid the way it is. Once everyone is on contract, we can have that discussion.

The metrics in the BAA will not change; although, the means of computing them may to some extent. We may add additional metrics along the way to ensure we are delivering a useful capability.

36: Can you elaborate on how you envision OneSAF in running Deep Green?

A: OneSAF Objective System (OOS) will form the foundation of the test harness. If a solution to Deep Green that includes OOS is chosen as Blitzkrieg, it must behave as described in the BAA.

37: Can you explain your vision of the difference between the likelihood assessment in Blitzkrieg and Crystal Ball?

A: Likelihood assessment in Blitzkrieg is about relative likelihood with respect to each of the qualitatively different futures that are generated at each branch point. These are *a priori* likelihoods, since they are generated without knowledge of the current state of the operation. Crystal Ball will modify these *a priori* likelihoods based on what is happening in the ongoing, real operation.

38: Will the integrator be responsible for an internet data exchange to facilitate early integration of each component during Phase I?

A: The integrator is responsible to proposing a method to allow collaborative development from geographically disparate developer teams.

39: To what extent does the technical integrator define the interfaces between Commander's Associate, Blitzkrieg & Crystal Ball versus OOS (defacto) defining the interface? The BAA leaves a lot to interpretation (perhaps with good reason) with

regard to how execution monitoring might cause dynamic re-planning. Can you elaborate at all?

A: The more open the interfaces, the better. The integrator has the role of defining what's the most proper interface and vet that with component developers. If those are interfaces that work in OneSAF, that's fine, but it is not a requirement. Other sources are industry standards, for instance. We need to define interfaces in such a way that nobody is cut out. The idea is for the integrator to find the best and most appropriate solution. If there's a conflict, the DARPA PM will adjudicate. The integrator's proposal must convince us that they can do this in an independent, "honest broker" manner.

40: If we need a Crystal Ball function to accomplish some part of Blitzkrieg development, should we guess at when that function will be useable in Phase I and/or in subsequent phases, or should we plan our effort assuming that the other component is immediately functional?

A: No, that's not a good assumption to say that the day we get on contract, Blitzkrieg, for instance, will magically exist. We'll assume we're successful at the end of Phase I. Do not assume the problem away. Yes, make reasonable, scientific assumptions, but you may need to propose an interim solution while you wait for another component to be fully realized.

41: Where does Task 4 sit in the overall architecture view?

A: Task 4 addresses the Automated Option Generation box in the Commander's Associate block diagram.

42: Military Scenario Definition Language (MSDL) – how fixed is the Knowledge Representation. Do we use MSDL as guidance for an anticipated comprehensive Deep Green knowledge representation? Or do we use MSDL as the basis for additional knowledge elements?

A: MSDL is called out in the BAA is because it's going through international standardization and it makes sense to use the only simulation initialization language that is going thru international standardization. MSDL is strongly encouraged, but it is not a requirement.

43: Even from one option, there could be many futures. Shouldn't Blitzkriegs have a utility function to reduce its search space?

A: Practically, yes. Initially, we want to see how many qualitatively different futures we can generate. There are a number of places where we might tune Deep Green for performance, such as aggressiveness of pruning and restrictions on branching factors, but it depends on what kind of hardware we put it on.

44: Will there be a way for Crystal Ball to help cloud what we're doing so that we can do a deception plan?

A: Remember that Crystal Ball does not do any planning. The planning occurs in Commander's Associate. Commander's Associate must allow the commander to describe deception plans.

45: What is the approximate size or cost per component?

A: No comment on size or cost of components. Sharpen your pencils and come up with the best proposal you can that addresses all the requirements.